Con Edison
Law Department
Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, N.Y. 10003

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BY FACSIMILE
Ms. Pauletta R. France-Isetts
Remedial Project Manager
Missouri/Kansas Remedial Branch
Superfund Division
United States Environmental
Protection Agency – Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Re: Proposed Allocation Formula for the
PCB Treatment, Inc. Superfund Sites

Dear Pauletta:

Con Edison continues to believe that the only reliable method for calculating the equivalent weights of the transformers that were handled at the PCB Treatment, Inc. ("PTI") Sites is to base the calculations on actual information regarding the type and amount of dielectric fluid that "full" transformers contained when they were shipped to PTI and that drained transformers were designed to hold. During our December 16th telephone conversion regarding EPA's proposed allocation formula for the PTI Sites, we began discussing the mechanics of using actual dielectric fluid data for transformers to calculate their equivalent weights. The attached table contains the fluid volume to weight conversion factors and PCB concentration and causation-handling multipliers that should be used when the type and number of gallons of dielectric fluid that a transformer contained or was designed to contain has been reported by the PRP who shipped the transformer to PTI.

The fluid volume conversion factors presented in the table take into account the difference in weight between the concentrated PCB dielectric fluid formulations that PTI drained from Askarel-type transformers and the mineral oil dielectric fluid ("MODF") that PTI used to flush out those transformers. The PCB concentration multipliers presented in the table to take into account the difference in PCB concentration between the MODF that PTI drained from mineral oil transformers and the spent flush solvents from mineral oil units. As Con Edison explained in its December 29th comments, the proposed allocation formula's failure to account for those differences causes it to overstate the equivalent weights of Askarel-type transformers and mineral oil transformers with PCB concentrations of between 500 ppm and 5,000 ppm and 10,000 ppm and 100,000 ppm.

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The conversion factors and multipliers presented in the attached table will produce the same equivalent weight results as the "actual data" case of the transformer fluid weight/equivalent weight sensitivity analysis that Con Edison submitted to EPA along with its December 29th comments on the proposed allocation formula. However, in conducting the "actual data" case of that analysis, Con Edison used a two step approach in which the equivalent weights of the dielectric fluid in its transformers and the flush solvent from them were calculated separately and then combined. Con Edison used such an approach to highlight the situations in which the proposed allocation formula's fluid weight and PCB concentration multipliers produced aberrant results and to make the underlying computations of the analysis easier to follow.

While EPA could certainly use the same two-step approach in its final allocation formula for the PTI Sites, that approach is somewhat cumbersome and would make the computer programming for the formula more complex than it needs to be. Con Edison felt that EPA would prefer a more streamlined approach in which the dielectric fluid and the flush solvent steps are combined and used that approach in developing the volume conversion factors and multipliers presented in the attached table. The conversion factors and multipliers for Askarel-type transformers are fairly straightforward. The multipliers for mineral oil transformers are slightly more complex. For most categories of mineral oil transformers, combining the dielectric fluid and flush solvent steps and correcting the proposed allocation's formula's flush solvent PCB concentration problem necessitated adjustments to the proposed allocation formula's PCB concentration and causation-handling multipliers.

Askarel-Type Transformers

As indicated in the attached table the overall multiplier for "full" Askarel-type transformers is 184.5 pounds/reported nameplate gallon. The overall multiplier is the product of a 20.5 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's existing PCB concentration and causation-handling multipliers (6.0 and 1.5, respectively) for "full" greater than 10,000 ppm PCB transformers. The 20.5 pounds/gallon conversion factor represents the combined weight of the concentrated PCB dielectric fluid that PTI drained from these transformers (13 lbs./gal) and the mineral oil (7.5 lbs./gal) that PTI used to flush them out these transformers.

The overall multiplier for drained Askarel-type transformers is 60.375 pounds/reported nameplate gallon--the product of an 8.05 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's existing PCB concentration and causation-handling multipliers for drained greater than 10,000 ppm PCB transformers (6.0 and 1.25). The 8.05 pounds/gallon conversion factor represents the weight of spent solvent mixture that PTI generated flushing out drained Askarel-type transformers with mineral oil.

As Con Edison noted in its December 29th comments, the EPRI data that EPA relied on in formulating the proposed allocation formula's assumptions for drained transformers indicate that draining typically removes 90% of a transformer's dielectric fluid. Consequently, the spent solvent mixture that PTI generated for drained Askarel-type transformers was comprised of 10% Askarel and 90% mineral oil and weighed 8.05 pounds/gallon (0.1 x 13 lbs/gal or 1.3 lbs/gal for the Askarel portion of the mixture plus 0.9 lbs/gal x 7.5 lbs/gal or 6.75 lbs/gal for the mineral oil portion of the mixture).

The overall multiplier for drained and flushed Askarel-type transformers is 2.415 pounds/reported nameplate gallon. Because these transformers were flushed out before they were sent to PTI, they contained residual flush solvent weighing 8.05 pounds/gallon rather than Askarel weighing 13 pounds/gallon. They were also drained after being flushed reducing the volume of flush solvent mixture in them by 90%. Consequently, the overall multiplier for these transformers is the product of a 0.805 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's existing PCB concentration and causation-handling multipliers.

Full Mineral Oil Transformers

The overall multiplier for "full" mineral oil transformers that contained less than 500 ppm PCBs is 15 pounds/reported nameplate gallon. The overall multiplier is the product of a 7.5 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's PCB concentration and causation-handling multipliers (1.0 and 2.0, respectively) for full, < 500 ppm PCB transformers. The 7.5 pounds/gallon represents the weight of the mineral oil dielectric fluid ("MODF") that PTI drained from the transformers.

PTI was required to flush transformers that contained ≥ 500 ppm PCBs. Therefore, the overall multipliers for ≥ 500 ppm PCB mineral oil transformers must account for the MODF that PTI drained from these transformers and the spent solvent that PTI generated flushing them out. Because PTI used mineral oil to flush out transformers, the MODF and flush solvents for ≥ 500 ppm PCB mineral oil transformers both weighed 7.5 pounds/gallon. Accordingly, the fluid volume conversion factor for ≥ 500 ppm PCB mineral oil transformers is 15 pounds/gallon which obviates the need to use a two step calculation process to account for the MODF and the flush solvent. However, as discussed above, combining the MODF and flush solvent steps requires that adjustments be made to the proposed allocation formula's other multipliers to account for the differences between the PCB concentrations of the MODF and the flush solvents from mineral oil units.

For mineral oil transformers that contained ≥ 500 ppm but less than 5,000 ppm PCBs, an adjusted PCB concentration multiplier must be used. While the MODF from these transformers contained ≥ 500 ppm PCBs, the flush solvent contained less than 500 ppm PCBs. Accordingly, the combined PCB concentration multiplier for these

transformers is 1.5 – the average of the proposed allocation formula's 2.0 multiplier for materials that contained between 500 ppm and 10, 000 ppm PCBs and 1.0 multiplier for materials that contained less than 500 ppm PCBs. The overall multiplier for mineral oil transformers that contained ≥ 500 ppm but less than 5,000 ppm is 45 pounds/reported nameplate gallon – the product of the15 pounds/gallon fluid volume conversion factor multiplied by the 1.5 adjusted PCB concentration multiplier and the proposed allocation formula's 2.0 causation-handling multiplier for full transformers with PCB concentrations of 500 ppm to less than 10,000 ppm.

The overall multiplier for mineral oil transformers that contained ≥ 5,000 ppm but less than 10,000 ppm PCBs is 60 pounds/reported nameplate gallon –the product of the 15 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's existing PCB concentration and causation-handling multipliers for full transformers with PCB concentrations of 500 ppm to 10,000 ppm. Because the flush solvents from these transformers contained ≥ 500 ppm PCBs, proposed allocation formula's PCB concentration multiplier does not have to account for differences between the PCB concentrations of the MODF in these units and their flush solvent.

Similarly, adjustments to the proposed allocation formula's PCB concentration multiplier and causation-handling multipliers are not required for mineral oil transformers that are assumed to contain more than 100,000 ppm PCBs under the proposed allocation formula. The overall multiplier for these units is 135 pounds/nameplate gallon – the product of the 15 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's existing PCB concentration and causation-handling multipliers for >10, 000 ppm PCB transformers. In practice, the PCB levels found in PCB-contaminated mineral oil transformers are typically well below 100,000 ppm. Therefore, the 135 pounds/reported nameplate gallon multiplier represents an extremely conservative worse case default multiplier for full mineral oil transformers for which there is no reported PCB concentration data.

For mineral oil transformers that contained between 10,000 ppm and 100,000 ppm PCBs, adjustments must be made to proposed allocation formula's PCB concentration multipliers and its causation-handling multipliers to account for the differences in PCB concentration between the MODF and flush solvent from these transformers. The 4.0 adjusted PCB concentration for these transformers is the average of the proposed allocation formula's existing 6.0 PCB concentration multiplier for materials that contained ≥ 10,000 ppm PCBs and its 2.0 multiplier for materials that contained between 500 ppm and 10,000 ppm PCBs. As explained in Con Edison's December 29th comments, due to dilution the PCB concentration of the flush solvents from transformers that contained between 10,000 ppm and 100,000 ppm PCBs would have not have exceeded 10,000 ppm.

The 1.675 causation-handling multiplier is the weighted average product of the proposed allocation formula's existing 1.5 causation-handling multiplier for full ≥ 10,000

ppm PCB transformers and its 2.0 causation-handling multiplier for oil containing 500 ppm to 10,000 ppm PCBs. Weighted averaging is necessary to account for the effects that the three to one difference between the PCB concentration multipliers for the MODF and flush solvent would otherwise have on the causation-handling multiplier when the equivalent weight of mineral oil transformers that contained between 10,000 ppm and 100,000 ppm PCBs is calculated using a one-step rather than two-step approach.

The equivalent weight calculations for a 100-gallon transformer that contained MODF with a PCB concentration of between 10,000 and 100,000 ppm PCBs demonstrate the soundness of using a weighted average basis for adjusting the causation-handling multiplier for 10,000 ppm -100,000 ppm PCB mineral oil units. When a two-step approach is used to calculate the equivalent weight of the transformer, the calculations for the MODF and flush solvent are as follows:

MODF - 100 gallons x 7.5 lbs/gal x 6.0 x 1.5 = 6,750 pounds
Flush - 100 gallons x 7.5 lbs/gal x 2.0 x 2.0 = 3,000 pounds

The equivalent weight of the unit is 9,750 pounds or 97.5 pounds/gallon. As indicated in the attached table the overall multiplier for full mineral oil transformers with PCB concentrations of between 10,000 ppm and 100,000 ppm is 97.5 pounds/reported nameplate gallon – the product of the 15 pound/gallon fluid volume conversion factor multiplied by the 4.0 adjusted PCB concentration multiplier and the 1.625 adjusted causation-handling multiplier.

Drained Mineral Oil Transformers

The overall multiplier for drained mineral oil transformers with PCB concentrations of less than 500 ppm is 0.75 pounds/reported nameplate gallon. These units did not require flushing and under the proposed allocation formula are assumed to have contained only 10% of the volume of MODF that they were designed to hold. Therefore, the fluid volume conversion multiplier for them is 0.75 pounds/gallon. Under the proposed allocation formula, the PCB concentration and causation-handling multipliers for them are both 1.0.

The fluid volume conversion factor for mineral oil transformers with PCB concentrations of 500 ppm or greater is 7.5 pounds/reported nameplate gallon to account for the mineral oil that PTI used to flush out > 500 ppm PCB transformers. As is the case with full ≥500 ppm PCB mineral oil transformers, adjustments to the proposed allocation formula's PCB concentration and causation-handling multipliers are needed to correct the proposed allocation formula's mineral oil flush solvent PCB concentration problem.

For drained, mineral oil units with PCB concentrations of between 500 ppm and 5,000 ppm the correct PCB concentration multiplier is the proposed allocation formula's 1.0 multiplier for materials that contained less than 500 ppm. Due to dilution, the PCB

concentration of the flush solvent for these transformers would have been less than 500 ppm PCBs. However, the handling-causation multiplier for the flush solvent is 2.0 – the proposed allocation formula's multiplier for oil that contained less than 500 ppm PCB because PTI presumably would have handled the spent flush solvent from these transformers in the same manner as oil containing less than 500 ppm. Accordingly, the overall multiplier for drained 500 ppm to 5,000 ppm PCB mineral oil transformers is 15 pounds/reported nameplate gallon.

For drained mineral oil transformers with PCB concentrations of between 5,000 ppm and 100,000 ppm, the correct PCB concentration multiplier is the proposed allocation formula's 2.0 multiplier for materials that contained between 500 ppm and 10,000 ppm PCBs. As explained in Con Edison's December 29th comments, the PCB concentrations of the flush solvents from these transformers would have ranged from 500 ppm to 10,000 ppm. The causation-handling multiplier is also 2.0 – the proposed allocation formula's causation-handling multiplier for oil that contained between 500 ppm and 10,000 ppm PCBs . Therefore, the overall multiplier for drained 5,000 ppm to 100,000 ppm mineral oil units is 30 pounds/reported nameplate gallon.

For drained mineral oil transformers with no reported PCB concentration information, the overall multiplier is 56.25 pounds/reported nameplate gallon – the product of the 7.5 pounds/gallon fluid volume conversion factor multiplied by the proposed allocation formula's 6.0 PCB concentration multiplier for materials that contained ≥ 10,000 ppm PCBs and its 1.25 causation-handling multiplier for drained > 10,000 ppm PCB transformers. Under the proposed allocation formula, transformers with no reported PCB concentration data are assumed to have > 100,000 ppm PCBs. Therefore, even with dilution, the PCB concentration of the flush solvent from such a unit would have exceeded 10,000 ppm.

Drained and Flushed Mineral Oil Transformers

The fluid volume conversion factor for all drained and flushed mineral oil units is 0.75 pounds/gallon. The correct PCB concentration multiplier for mineral oil units that contained less than 5,000 ppm PCBs before they were drained and flushed is the proposed allocations formula's 1.0 multiplier for materials that contained less than 500 ppm PCBs. Due to dilution, the residual flush solvent in these transformers would have contained less than 500 ppm PCBs. The correct PCB concentration multiplier for mineral oil units that contained between 5,000 ppm and 100,000 ppm PCBs before they were drained and flushed is the proposed allocation formula's 2.0 multiplier for materials that contained between 500 ppm and 10,000 ppm PCBs. The residual flush solvent in these units would not contain PCBs at concentrations exceeding 10,000 ppm. The applicable PCB concentration multiplier for drained and flushed mineral oil units for which no PCB concentration data is available is the proposed allocation formula's 6.0 multiplier for materials that contain more than 10,000 ppm PCBs. Under the proposed allocation formula, transformers for which PCB concentration data has not been reported are

assumed to contain more than 100,000 ppm PCBs. Even with ten-to-one dilution, the flush solvent of a transformer with PCB levels of over 100,000 ppm would exceed 10,000 ppm.

Please do not hesitate calling me if you have any questions concerning this matter. I can be reached at (212) 460-3241.

Very truly yours,

Michael A. Wilcken

Michael A. Wilcken
Associate Counsel

TRANSFORMER ALLOCATION MULTIPLIERS

FULL MINERAL OIL TRANSFORMERS

PCB Concentration	Fluid Volume to Weight Conversion Multiplier	PCB Concentration Multiplier	Handling –Causation Multiplier	Overall Multiplier	Equivalent Weight Equation
< 500 ppm	7.5 lbs/gal	1	2	15 lbs/gal	Nameplate Gallons x 15 lbs/gal = Equivalent Weight
≥ 500 < 5,000 ppm	15 lbs/gal	1.5	2	45 lbs/gal	Nameplate Gallons x 45 lbs/gal = Equivalent Weight
≥ 5,000 < 10,000 ppm	15 lbs/gal	2	2	60 lbs/gal	Nameplate Gallons x 60 lbs/gal = Equivalent Weight
≥10,000 < 100,000 ppm	15 lbs/gal	4	1.625	97.5 lbs/gal	Nameplate Gallons x 97.5 lbs/gal = Equivalent Weight
≥100,000	15 lbs/gal	6	1.5	135 lbs/gal	Nameplate Gallons x 135 lbs/gal = Equivalent Weight

DRAINED MINERAL OIL TRANSFORMERS

PCB Concentration	Fluid Volume to Weight Conversion Multiplier	PCB Concentration Multiplier	Handling –Causation Multiplier	Overall Multiplier	Equivalent Weight Equation
< 500 ppm	0.75 lbs/gal	1	1	0.75 lbs/gal	Nameplate Gallons x 0.75 lbs/gal = Equivalent Weight
≥ 500 < 5,000 ppm	7.5 lbs/gal	1	2	15 lbs/gal	Nameplate Gallons x 15 lbs/gal = Equivalent Weight
≥ 5,000 < 10,000 ppm	7.5 lbs/gal	2	2	30 lbs/gal	Nameplate Gallons x 30 lbs/gal = Equivalent Weight
≥10,000 < 100,000 ppm	7.5 lbs/gal	2	2	30 lbs/gal	Nameplate Gallons x 30 lbs/gal = Equivalent Weight
> 100,000 ppm	7.5 lbs/gal	6	1.25	56.25 lbs/gal	Nameplate Gallons x 56.25 lbs/gal = Equivalent Weight

DRAINED & FLUSHED MINERAL OIL TRANSFORMERS

PCB Concentration	Fluid Volume to Weight Conversion Multiplier	PCB Concentration Multiplier	Handling-Causation Multiplier	Overall Multiplier	Equivalent Weight Equation
< 500 ppm	0.75	1	0.5	0.375 lbs/gal	Nameplate Gallons x 0.375 lbs/gal = Equivalent Weight
≥ 500 < 5,000 ppm	0.75	1	0.5	0.375 lbs/gal	Nameplate Gallons x 0.375 lbs/gal = Equivalent Weight
≥ 5,000 < 10,000 ppm	0.75	2	0.5	0.75 lbs/gal	Nameplate Gallons x 0.75 lbs/gal = Equivalent Weight
≥ 10,000 < 100,000 ppm	0.75	2	0.5	0.75 lbs/gal	Nameplate Gallons x 0.75 lbs/gal = Equivalent Weight
> 100,000 ppm	0.75	6	0.5	2.25 lbs/gal	Nameplate Gallons x 2.25 lbs/gal = Equivalent Weight

ASKAREL-TYPE TRANSFORMERS

Condition	Fluid Volume to Weight Conversion Multiplier	PCB Concentration Multiplier	Handling –Causation Multiplier	Overall Multiplier	Equivalent Weight Equation
Full	20.50 lbs/gal	6	1.5	184.5 lbs/gal	Nameplate Gallons x 184.5 lbs/gal = Equivalent Weight
Drained	8.05 lbs/gal	6	1.25	60.375 lbs/gal	Nameplate Gallons x 60.375 lbs/gal = Equivalent Weight
Drained/Flushed	0.805	6	0.5	2.415 lbs/gal	Nameplate Gallons x 2.415 lbs/gal = Equivalent Weight